

published application, US 2007/0122336 A1. The errors were not present in the application filed with the USPTO as WO 2005/040040 A1.

In the Claims:

Claims 22-42 are pending in the application. Please amend Claims 22 and 41, cancel Claim 32 and add Claim 43. A listing of the claims showing the proposed amendments is attached hereto as Appendix B.

Declaration and Power of Attorney

Please substitute the revised Declaration and Power of Attorney enclosed with this Response to Office Action and Amendment for the originally filed Declaration and Power of Attorney.

Remarks

Oath / Declaration

The Examiner objected to the original oath / declaration filed on July 20, 2006 as being defective for failing to include the city or town of the residence for all the inventors. A revised Declaration and Power of Attorney, which includes the city or town of residence for all of the inventors is enclosed.

Claim rejection under 35 USC § 112

Claim 41 was rejected under 35 USC § 112, 2nd paragraph, as being indefinite. In particular, the Examiner noted that the claim referred to “the place of reaction” but did not set forth what the reaction is. Claim 41 has been amended to clearly indicate that the reaction referred to is the reaction between the iron sulfate-containing spent sulfuric acid or the iron-laden sulphuric acid materials with the iron chloride-containing material.

Claim rejection under 35 USC § 103

Claims 22-42 were rejected under 35 USC § 103(a) as being unpatentable over Connolly, US 5,417,955 in view of Watanabe et al., US 4,082,832. The Examiner finds that Connolly describes a process for manufacturing ferrous sulfate (FeSO₄) by mixing an FeCl₂

pickle liquor from the pickling of steel with what appears to be fresh sulfuric acid of a concentration ranging from 10 to 98 percent by weight.

Applicants claim the use of an iron containing spent sulfuric acid, which is reacted with a material containing iron chloride to form ferrous sulfate.

The Examiner finds that Watanabe et al. disclose the generation of spent sulfuric acid from the titanium dioxide production process, wherein the spent sulfuric acid is abundant with heavy metal ions. Thus, it would have been obvious to substitute the heavy metal containing spent sulfuric acid from Watanabe et al. for fresh sulfuric acid in the process of Connolly, because of the expected advantage of saving money.

For the following reasons, Applicants disagree with the Examiner's assessment.

Applicants note that Claim 22 has been amended to include all of the limitations of Claim 32, namely that the claimed method is characterized by a concentration of iron ions in the iron-laden spent sulfuric acid or in the iron-laden sulfuric acid material in the range of 2 to 22 weight %. Support for the amendment may be found in paragraph [006] of US 2007/0122336 A1. All of the pending claims are dependent upon Claim 22.

Connolly describes a two-step process. In a first step, as an intermediate product, iron (II) sulfate is obtained by reacting FeCl_2 with a concentrated sulphuric acid, preferably having an H_2SO_4 and content of 93 wt.% (see column 3, lines 22 to 25). Such a highly concentrated sulphuric acid cannot be used according to the claimed method, which requires a minimum iron concentration of 2 wt.%. In this respect, reference is made to the document JP 11 322 343 A, attached hereto as Exhibit 1, showing the solubility of iron in sulphuric acid. The concentration of at least 2% iron can be obtained only at concentrations of approximately 45% H_2SO_4 and lower.

It appears to be the Examiner's position that the concentrated sulphuric acid used by Connolly could easily be replaced by a sulphuric acid as described by Watanabe. This, however, is not the case. The Connolly two-step process is a rather complex method (see for example Figure 1), and such a complex method requires a delicate balance between mass flows, concentration of the chemicals, temperature, pressure, energy flows and residence times. Of course, if one were to significantly reduce the sulphuric acid concentration in the first step of this method, this would have a significant impact on the other process parameters, this impact being unpredictable in view of the complexity of this process. In other words, it is not obvious

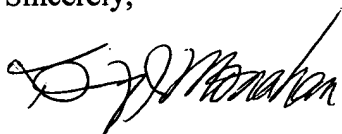
to replace the highly concentrated sulphuric acid used in Connolly by one having a lower sulphuric acid content and an iron content of at least 2% since the skilled person would not know how such an intervention into the process of Connolly would affect its feasibility. Consequently, one cannot possibly state that there is an advantage expected by such a replacement, as alleged by the Examiner.

Moreover, it is submitted that Watanabe fails to disclose a sulphuric acid with an iron content of at least 2 wt.%. Watanabe rather discloses a process wherein iron sulphate is precipitated from a sulphuric acid and remaining ferrous ions, if any, are oxidized to Fe^{3+} which are subsequently extracted. The removal of iron from the sulphuric acid is opposite to the claimed teaching which requires a minimum iron concentration of at least 2% in the sulphuric acid.

The Examiner's attention is further directed to Examples 1-3 in the present application. A sulfate sludge obtained from titanium dioxide process, having an iron content of approximately 4 to 10 wt. % iron, was mixed with an FeCl_2 solution, to obtain FeSO_4 . Absent applicants' teaching, there is no suggestion that such an iron-laden sulfate material could successfully be mixed with a FeCl_2 solution, to achieve the desired end products.

Applicants submit that the claims are in condition for allowance and respectfully request the same.

Sincerely,



Timothy J. Monahan

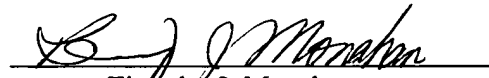
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Date: November 25, 2008

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, Post Office Box 1450, Alexandria, Virginia 22313-1450, on November 25, 2008, along with a postcard receipt.

- Response to Office Action and Amendments;
- Appendix A;
- Appendix B;
- Exhibit 1;
- New Oath/Declaration; and
- Petition for Extension of Time (3 months).


Timothy J. Monahan

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